

Claims

1. A fuel-air mixture device comprising:
  - a primary air passage having an inlet, an adjustable throttle and an outlet,
  - a variable orifice nozzle for introducing fuel to the primary air passage, the  
5 nozzle having a mouth and a tapered needle in the mouth to provide variability of the orifice by axial movement of the needle, the needle being arranged transversely of the primary air passage and
  - a linkage or control device for linking or controlling the position of the needle to the position of the adjustable throttle in the primary air passage for  
10 adjustment of the orifice of the nozzle and
  - an apertured vaporisation block having a plurality of air passageways through the block, which subdivide a portion of the primary air passage between the fuel introduction position and the outlet.
2. A fuel-air mixture device as claimed in claim 1, wherein the apertured  
15 vaporisation block is integral with a member defining the primary air passage.
3. A fuel-air mixture device as claimed in claim 1, wherein the apertured vaporisation block is a member fitted to the primary air passage.
4. A fuel-air mixture device as claimed in claim 3, wherein the apertured vaporisation block is mounted in such manner as to be ultrasonically excitable.
- 20 5. A fuel-air mixture device as claimed in claim 4, wherein the apertured vaporisation block is mounted in an ultrasonically excitable ring.
6. A fuel-air mixture device as claimed in claim 4, wherein the passageways in the block are lined by ultrasonically excitable tubes.
7. A fuel-air mixture device as claimed in any preceding claim, wherein the  
25 apertured vaporisation block is a solid block in which the air passageways are formed by machining or casting.
8. A fuel-air mixture device as claimed in any one of claims 1 to 6, wherein the apertured vaporisation block is laid up from a plurality of layers, preferably by winding, the layers having regular formations extending out from each layer to space  
30 it from the next layer.
9. A fuel-air mixture device as claimed in claim 8, wherein the formations at each layer are continuous with the formations at the next.

10. A fuel-air mixture device as claimed in claim 8, wherein the formations at each layer are inter-spaced with the formations at the next.
11. A fuel-air mixture device as claimed in any preceding claim, wherein the apertured vaporisation block is provided wholly downstream of the position of the fuel introduction means.
12. A fuel-air mixture device as claimed in claim 11, wherein an upstream face of the apertured vaporisation block is concavely formed, preferably conically.
13. A fuel-air mixture device as claimed in any one claims 1 to 10, wherein the apertured vaporisation block is provided at and extending downstream of the position of the variable orifice nozzle.
14. A fuel-air mixture device as claimed in any preceding claim, including:
- a secondary air passage having an inlet and an outlet to the primary air passage between its adjustable throttle and its outlet,
- the arrangement being such that in use the fuel mixes with the air flowing through the secondary air passage prior to mixing with the air flowing in the primary air passage and the fuel flow from the nozzle is matched to the position of the adjustable throttle.
15. A fuel-air mixture device as claimed in claim 14, wherein the apertured vaporisation block has at least one transverse bore leading from the secondary air passage to a respective one of the air passageways through the block.
16. A fuel-air mixture device as claimed in claim 15, wherein each of the passageways has a transverse bore leading from the secondary air passage.
17. A fuel-air mixture device as claimed in claim 15, wherein some of the air passageways are not in communication with the secondary air passage, whereby they do not receive fuel-air mixture in use.
18. A fuel-air mixture device as claimed in claim 15, claim 16 or claim 17, wherein some of the air passageways are in communication with the secondary air passage only via others of them.
19. A fuel-air mixture device as claimed in any one of claims 14 to 18, wherein the fuel introduction needle extends into one or more of the air passageways in the apertured vaporisation block.
20. A fuel-air mixture device as claimed in any one of claims 15 to 19, wherein the passageway(s) having the transverse bore(s) are configured as venturi(s) with the narrowest throat(s) being at the orifice(s) of the transverse bore.

21. A fuel-air mixture device as claimed in any one of claims 15 to 20, wherein the passageway(s) have turbulence inducing formations downstream of the transverse bore(s), to aid mixture of the fuel with the air in the passageways.
22. A fuel-air mixture device as claimed in any preceding claim, including:
- 5       • a shaft on which the throttle is carried,  
      • a cam plate carried on a shaft and  
      • an actuator for the tapered needle bearing against the cam plate.
23. A fuel-air mixture device as claimed in claim 22, wherein the needle actuator is accommodated in a fuel tight manner in a needle carrier and extends into a lubricant
- 10       chamber where the cam plate acts on it.
24. A fuel-air mixture device as claimed in claim 23, wherein the needle is carried axially of the needle actuator and spring biased towards the primary air passage for closure of a fuel outlet orifice from the needle carrier to the primary air passage by engagement of a taper of the needle in the orifice.
- 15       25. A fuel-air mixture device as claimed in claim 24, wherein the needle carries an O-ring arranged to seal additionally the orifice with the needle.
26. A fuel-air mixture device as claimed in claim 23, claim 24 or claim 25, wherein the needle carrier has an extension in communication with the primary air passage and the extension has two outlets from the secondary air passage into the
- 20       extension.
27. A fuel-air mixture device as claimed in claim 26, wherein one of the outlets is from a slow running branch of the secondary air passage, having a slow running air flow adjustment and a second branch which is normally open, except when closed by a closure valve on closure of the throttle.
- 25       28. A fuel-air mixture device as claimed in claim 27, wherein the closure valve comprises a flat on a shaft of the throttle, which is arranged to open the branch when the throttle is open.